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(71) Applicant: PITNEY BOWES INC.
Stamford Connecticut 06926-0700 (US)

(72) Inventors:
• Daniels, Jr., Edward P.
Trumbull, CT 06611 (US)

• Woodman, Clare E.
Norwalk, CT 06851 (US)

(74) Representative: Avery, Stephen John et al
Hoffmann, Eitle & Partner,
Patent- und Rechtsanwälte,
Arabellastrasse 4
81925 München (DE)

(54)   **Customizing application software in software controlled machines**

(57)   A method of customizing application software in an inserting system (10) includes the steps of providing a system baseline program (50) for operating the inserting system (10) in a standard baseline mode, and providing a dynamic link library (DLL) (52) including a table of features to be included in the inserting system and an application routine corresponding to each of the features. A call table (51) in the system baseline program is linked with an address for each feature corresponding to the location of the application program for the feature. The DLL (52) is customized based on information received from the baseline program. Each of the features is called when indicated in the system baseline program (50) and information is provided to each DLL application program corresponding to the feature. The information is modified to make the system baseline program (50) execute a different set of logic corresponding to the customization of the machine. A sub-dynamic link library (sub-DLL) (60) may be provided for further customization. The sub-DLL (60) includes a table (64) of sub-features to be included in the inserting system (10) and an application sub-routine corresponding to each of the sub-features. The sub-DLL is similarly integrated with the DLL and called by the DLL routines.

FIG. 2
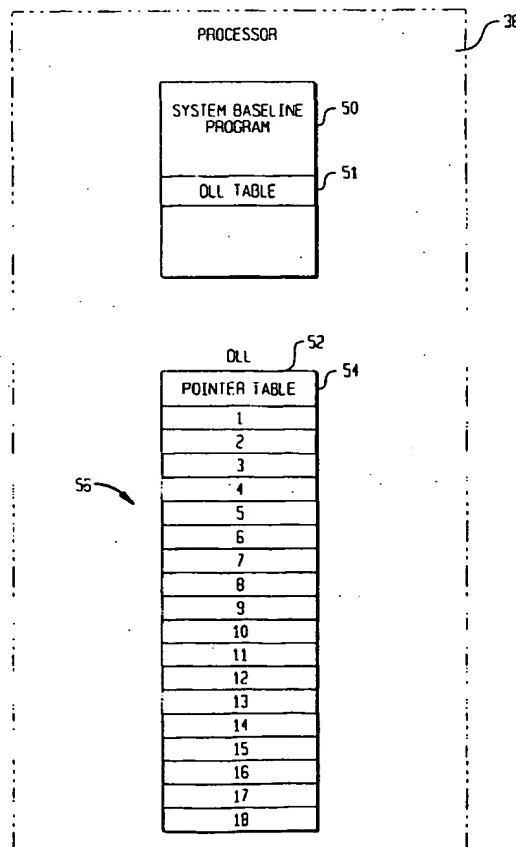
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Description

The present invention relates generally to a method of customizing the software controlling a machine and. more particularly, to a method of customizing the software controlling inserting machines.

5   There are three types of software controlled machines. Standard off-the-shelf machines comprise identical hardware and software for specific revision levels and software releases. Such machines are intended for sale in large quantities at each revision level. A custom built machine is a machine that is generally built once or, if more than once, is built for one customer. The custom built machine is intended for use for a unique purpose that is usually associated with a particular customer. The third type of software controlled machine is a hybrid of the off-the-shelf and custom
10   built machines and is generally referred to as a customized machine.

A customized machine generally includes a core hardware and software design that the manufacturer modifies to meet the requirements of each customer. Such machines are typically sold in quantities greater than a custom built machine, but less that off-the-shelf machines. The time for manufacturing a customized machine is generally greater than for an off-the-shelf machine, but less than for a custom built machine. Typically, the greater the amount of cus-
15   tomization. the longer the manufacture time which includes testing and debugging of the control and application software.

Console inserters, such as the Pitney Bowes 9 Series™ Inserting System manufactured by the the present applicants, of the present invention, are large mail processing machines that are configured to meet the specific requirements of each customer. Since each customer generally has requirement that differ from other customers, manufacturers of
20   such inserters must customize each inserter to meet each customer's requirements.

Heretofore, the customizing of inserting systems has typically required customizing the control software so that the inserting systems meet the specific requirements of the customer. This is an inherent problem experienced in the manufacture of customized machines, such as inserting systems, because whenever changes are made to the control software. the entire machine and control software must be tested to verify that the performance of the machine has
25   not regressed as a result of the changes. Depending on the nature of the change, such regression testing may be quite extensive. The extent of the impact on the manufacturing process is proportional to the amount of customization of the control software. Although inserting systems are considered customized machines, customer requirements in recent years have expanded to the point that the control software has resembled custom software more than customized software.

30   Another problem experienced with the customizing of the control software of the inserters is the plurality of versions of the control software in the field. Even though the inserting systems in the field are performing basically the same inserting functions, the control software of each inserting system differs in some respect from the control software of the others based on the customized features in each inserter. One way manufacturers have controlled this problem has been to limit the applications available to customers. However, in today's competitive market, this is no longer a
35   practical solution.

A more practical solution to the problem of adding applications for a particular customer has been to include the applications through an additional computer and user interface that is separate from the main computer and interface of the machine. Although this solution reduces the need for modifying the control software of the machine, it adds significant cost to the machine which is undesirable in a competitive market.

40   Since each customer has its own unique applications with regard to information input to and output from an inserting system, the customers, and in particular customers employing large production mail facilities, want inserting systems having features that meet their unique requirements, but which are delivered fully tested and fully supported after delivery. The manufacturer wants to deliver a reliable system to its customers that provides them with the customized features that they require. However, such desires are difficult to achieve when each inserting system more resembles
45   a custom system than a customized system because the customization occurs in the control program.

It has been found that the present invention provides a method of customizing the software controlling a machine with customer specific features without the need to perform regression testing to the standard software of the machine. In accordance with the present invention a baseline program controls the machine in a standard baseline mode and a dynamic link library is used to integrate customer specific applications into the machine. It has been found that the
50   present invention provides a more reliable machine that is easier to manufacture, test and modify with regard to such customer specific features.

In accordance with the present invention, a method of customizing application software in an inserting system includes the steps of providing a system baseline program for operating the inserting system in a standard baseline mode, and providing a dynamic link library (DLL) including a call table of features to be included in the inserting system
55   and an application routine corresponding to each of the features. The call table in the system baseline program is linked with an address for each feature corresponding to the location of the application program for the feature. The DLL is customized based on information received from the baseline program. Each of the features is called when indicated in the system baseline program and information is provided to each DLL application program corresponding

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